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PRESSING.

are supported entirely by the subscriptions paid by gin-owners, the receipts for work done and the balance of the former Cotton Frauds Funds.

The first attempt to press cotton was made about 1836 when the Bombay Government established screw presses at Dhárwár, Gadag, and Navalgund. In 1848 Mr. Blount one of the American planters renewed the attempt to start a cotton press; but his attempt also seems to have failed. In 1855 Messrs. Brice and Company bought some presses from the Government factory and worked them in the district. This attempt like the two previous ones proved a failure. The cause of these repeated failures was the want of confidence in the ginners and dealers. So long as the cotton was in a loose bundle it was easy for the exporter or the exporter's agent to open and test a bundle but with pressed bales there was no security. Even in 1864-65 no sort of pressing was in general use till Mr. Walton made a vigorous effort to introduce half-pressing. In 1873-74 Messrs. P. Chrystal and Co. started the first full-press in the district at Gadag. The press was worked by a steam engine and during that season pressed and packed 3400 bales chiefly of American cotton. In the same year the Kárwár Company started a steam press at Hubli. Since 1876-77 four steam full-presses have been at work, two at Gadag and two at Hubli. At present (1884) four steam presses are at work, two at Hubli and two at Gadag, and two hand or half presses, one at Hubli and one at Gadag. Of these the two steam presses at Hubli and one of the two at Gadag, each of twenty horse power, are owned by Messrs. Framji and Company and the other steam press at Gadag of twenty-five horse power, is owned by the West Patent Press Company. The two hand presses belong to Messrs. Robertson Brothers and Company. Besides the engineer, engine-driver, fireman, fitter, and blacksmith, a steam press, when at work employs about sixteen men and sixteen women labourers, mostly Maráthás and Musalmáns. Men are paid 4½d. to 6d. (3-4 as.) a day and women 3d. (2 as.). April and May are the busiest months for pressing. During the three years ending 1883, of the three presses owned by Messrs. Framji and Company the Gadag factory pressed about 3000 bales and the two Hubli presses about 1000 bales a year, almost all of local or Kumta cotton. The other Gadag press owned by the West Patent Press Company did no work during the four years ending 1883; in 1884 it pressed some saw-ginned Dhárwár. The full-pressed bales chiefly go by Kárwár to Bombay.

SPINNING.

In a Hindu house there is next to no sewing. Almost all clothes are worn as they come from the loom, so that when there is no field work, after their house work is over, the women have a good deal of spare time. As a class the women are hardworking and spend all their spare time in spinning. Most women spin five hours a day, and others whose house work is light, spin still longer. For hand spinning local or Kumta cotton is alone used. Cotton to be used for local spinning is cleaned with very much greater care than cotton to be packed for export. In ginning for home spinning almost no seed dirt or leaf is left. This clean cotton is given to Pinjárs who thoroughly loosen and divide it, and make it into little rolls or *hanjis* of the size of the finger. These *hanjis* are spun by the spinning wheel called *nulurati* which costs about 4s. 6d. (Rs. 2¼). The thread

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thus spun is rolled into small oblong reels or *kukdis* by the aid of the same spinning wheel. The yarn of these reels is then spread on a wooden frame or *hasmari* which is fitted with pegs and costs 1s. 6d. (12 *as.*). The threads when thus arranged are called *putis* or hanks of yarns. These *putis* are brought to market and sold to weavers, carpet-makers, and rope-spinners. In September 1883 a beginning was made of spinning cotton by steam power at Hubli. In September 1881 a spinning mill called the Southern Marátha Spinning and Weaving Company Limited was registered in Bombay. It is a company with limited liability and has a capital of £60,000 (Rs. 6,00,000) divided into 2400 shares of £25 (Rs. 250) each. The managers and secretaries of this company are Messrs. P. Chrystal and Company of Bombay and Hubli. On the 1st of September 1882 the foundation stone was laid at Hubli, and in spite of the great difficulty of carrying the heavy machinery from Kárwár to Hubli by the Árbail pass, a one-storeyed building covering 4000 square yards and capable of holding 10,000 spindles, besides the engine and boiler house, was finished and machinery fitted by the 2nd of September 1883 when work was begun. The machinery is made by Messrs. Platt Brothers and Company Limited, Oldham. It is worked by a compound engine of 400 horse power, driving a fly-wheel twenty-four feet in diameter and making fifty revolutions a minute. In March 1884 4700 spindles were at work yielding a daily outturn of about 1300 pounds of yarn. Local or Kumta cotton was found better suited for spinning than saw-ginned American. In March 1884, besides spinners jobbers and fitters, the factory employed 250 hands; the men were paid 6d. to 1s. (4-8 *as.*) a day, the women 4½d. (3 *as.*), and the children 3d. to 4½d. (2-3 *as.*). The only Europeans on the staff are the manager and the engineer. The factory promises well. Cotton grows abundantly at the door and the yarn has a large demand in the neighbouring towns of Belgaum, Hubli, Gadag, Ránbennur, and other weaving centres. Up to March 1884, of the 2400 nominal shares, 1210 equal to a capital of £30,250 (Rs. 3,02,500) have been taken, 396 in the district, 110 in England, and 704 in Bombay and its neighbourhood.

Chiefly in the towns of Annigeri, Betigeri, Dambal, Gadag-Betigeri, Garag, Hubli, Lakundi, Nadgund, and Navalgund, both cloth of gold and silver and plain or silk-bordered cotton cloth are woven by a large number of Lingáyats, Hatkár or Devang, Patvegár, Sáli, and Momin Musalmán weavers. Of about 2400 cotton and silk weavers, about 1250 are Musalmáns, 500 Patvegárs, 300 Devangs, 200 Sális, 150 Lingáyats, and twenty-five Native Christians. The materials used in weaving this silk-cotton cloth are chiefly thread, silk, and gold or silver lace. Up to about 1872 thread spun locally by women of the labouring and cultivating classes, especially by Holeru or Mhár women which was the finest and best, was largely used by the weavers. Part of this home-spun yarn was used uncoloured in weaving waistcloths and other coarse *dangri* cloths; part was coloured and used in making women's robes or *sádís*, bodices or *kubsás*, and headscarves or *rumáls*. The dyers of cloth and yarn are Lingáyats, Námdev Shimpis, and Musalmáns, and the chief colours dyed are black, blue, pink, scarlet, and yellow. Since 1872 Bombay machine-spun yarn, which is better finer and cheaper, has to a great extent driven the home-spun

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yarn out of the market. Cloth-dealers and rich moneylenders bring the machine-spun yarn from Bombay by Kumta and Kárwár. The machine-spun yarn is chiefly used in weaving fine waistcloths and women's robes, bodicecloths, and headscarves. Almost all cloths valued at more than 10s. (Rs. 5) each are made of machine-spun thread. As the hand-made yarn sells dearer than the machine-spun yarn and also requires more labour in weaving, the cost of weaving cloth out of hand-made yarn is about twenty-five per cent higher than of weaving cloth out of machine-spun yarn. Though dearer and coarser than machine-spun yarn, the home-spun yarn is much stronger and much more able to stand hard work. Of the yarn used in local weaving about one-third is still home-spun. The home-spun yarn is chiefly used in weaving coarse waistcloths and women's robes, coarse longcloth called *dangri jot* or *khádi*, and carpets, floorcloths or *jájams*, and tent or booth-cloths called *gudárs* (K.) or *páls* (M.). Of the other raw materials the coloured silk and the gold and silver lace come from Bombay, and the uncoloured silk partly from Bombay and partly from Maisur. The weavers are partly capitalists and partly labourers employed by the capitalists either by the day or by the piece. Handloom weaving is brisker during the marriage and fair-holding months, especially from January to May. The women of weavers who have capital help the men, and the women of labouring weavers work for hire, in arranging and sizing the warp and in filling the shuttles. A cotton weaver on an average earns not less than 4½d. to 6d. (3-4 as.) a day. The clothes woven in the Dhárwár looms are *dhotars* or men's waistcloths about five yards long and one yard broad. They vary in price from 1s. 3d. to 1s. 6d. (10-12 as.) when made of coarse village yarn, and from 2s. to £1 (Rs. 1-10) when made of fine machine-made twist with silk borders and costly colours. *Punjis* or boys' waistcloths, about 1½ to two yards long and three-quarters to one yard broad, are generally made of coarse village yarn and vary in price from 4½d. to 9d. (3-6 as.). *Sádís* or women's robes, about 7½ yards long and one yard broad, vary in price from 3s. to 8s. (Rs. 1½-4) when made of coarse village yarn, and from 8s. to £2 10s. (Rs. 4-25) when made of English or Bombay mill yarn with silk borders. *Kirgis* or girls' robes, about 3½ to five yards long and two to 2½ feet broad, vary in price from 1s. 3d. to 2s. 3d. (Rs. ½-1½) when made of coarse village yarn, and from 3s. to 16s. (Rs. 1½-8) when made of English and Bombay mill made yarn with silk borders. *Kubsás* or bodicecloths about three-quarters of a yard long and half a yard broad, vary in price from 3d. to 4½d. (2-3 as.) when made of village coarse yarn, and from 6d. to 2s. 9d. (Rs. ¼-1½) when made of English and Bombay mill yarn. Both *mundars* or turbans, 7½ to fifty yards long and sixteen to twenty inches broad, and *shellás* or men's sholder cloths 2½ yards long and 1½ broad, vary in price from 2s. to £7 10s. (Rs. 1-75). By adding gold or silver tinsel borders, turbans and sholdercloths fetch a still higher price. *Vastas* or handkerchiefs, fifteen inches to one yard square, vary in price from 2½d. to 9d. (1½-6 as.) when made of coarse village yarn, and from 1s. 3d. to 2s. (Rs. ½-1) when made of English or Bombay mill yarn. In a few towns, especially in Hebsur and in Kerásur and its neighbourhood, tents or booth cloths called *páls* are made. They are first woven in strips of coarse

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strong cotton cloth of various lengths, and ten to sixteen inches wide. These lengths are then sewn together, until they form the *pāls* or booth cloths which are twelve to thirty feet long and eight to twenty-five feet broad, and sometimes even larger. They are used as carpets, as cloths for sorting grain or for carrying grain in carts from the fields, for rude tents and booths at fairs or *jātrās*, and for market stalls. They range in price, according to size and quality, from 14s. to £2 (Rs. 7-20). Cotton and silk cloth are sold by the weavers either to the local cloth-dealers or to the people on market days. Cloth is bought either direct from the weavers or through brokers or *daldāls* who are paid by the weavers $\frac{3}{4}d.$ to $\frac{1}{2}d.$ ($\frac{1}{4}-\frac{1}{2} a.$) on every rupee of cloth sold. Most of the cloth is used locally. It is also exported to North and South Kánara and Belgaum and Sháhápúr; from Belgaum and Sháhápúr it goes to the coast for sale. Especially from Gadag-Betigeri it is also sent to Sholápúr, Pandharpur, Mudhol, Jamkhandi, Jath, and Sāngli. Between 1862 and 1865, when cotton and grain were both unusually dear, in spite of the good demand for cloth, the weavers suffered. The fall in the price of grain and of cotton between 1866 and 1872 helped the weavers, and since 1872 cheap Bombay yarn has enabled them to hold their own against imported cloth. The weavers suffered grievously in the 1876 famine. The price of grain ruined them and the sale of cloth was at a stand; most of them passed out of the famine heavily laden with debt. Since 1876 the brisk local demand for cloth, the fall in price of Bombay yarn, and the local cheapness of grain have so greatly helped the hand-loom weavers that many of them have freed themselves from their famine debt and are fairly off. The opening of the new railways will help the weavers by cheapening Bombay yarn. But it will also increase the competition of outside goods, and, by raising the local price of grain, will make living dearer to the hand-loom weavers and so prevent them producing their cloth as cheaply as before. The opening of railways will also probably be followed by the establishment of local spinning and weaving mills, and, in the end, even more than at present, hand-made products will be ousted by steam-made.¹ The

¹ From its much greater bulkiness compared with its value the road-carriage of yarn is much costlier than the road-carriage of cloth. In spite of this disadvantage in rich cotton and grain growing tracts like the Bombay Karnatak, which long road distances separate from railways and from boats, cloth woven locally from imported yarn has of late years held its own with imported cloth. Railways, the great cheapeners of the carriage of bulky articles, should remove or should greatly lessen the disadvantage which long road carriage inflicts on imported yarn in competing with imported cloth. The opening of railways should favour the import of yarn more than the import of cloth; handloom weaving should therefore increase in Dhárwār after the railways are opened. But judging by their effect in other districts, instead of fostering local handloom weaving, railways will reduce or destroy the industry. One of the reasons, why, in spite of the gain from the special cheapening of imported yarn, railways smother handloom weaving seems to be the marked increase in the price of grain, and therefore in the cost of living, which follows the opening by railways of new markets for bulky local field produce. The cost of feeding his family rises so greatly, that, in spite of the gain in the relatively greater cheapening of imported yarn, the handloom weaver fails to maintain his competition with imported cloth; he can no longer live on the margin of profit which used to be enough for his support. The rise in the price of local grain which they cause by opening fresh markets to local field produce seems the chief reason why railways work the ruin of local industries. At the same time, as the bulk of the people are grain growers not craftsmen, the gain from the rise of grain prices is probably greater than the loss from the decay of local industries.

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silk weavers suffered specially severely during the 1876 famine as there was a great scarcity of silk as well as of grain.

Besides by the prisoners in Dhárwár jail cotton carpets are woven by sixteen Musalmán families, of whom eight live at Navalgund, seven at Hubli, and one at Dhárwár. Of the raw materials used the *patta* or thick hand-spun yarn is bought locally. The women of the carpet-weaving families twist a large quantity of yarn into strong and long warp threads, either by hand or by the simple spinning and twisting wheel. They then arrange and size these twisted threads till they are about one hundred feet long, and roll them round a roller which is fixed in the loom. Some of the yarn is dyed red, black, blue, green, and yellow, and occasionally green and yellow yarn is brought from Bombay and used untwisted for the woof. The carpet weaver's women fill a large number of shuttles with red and black yarn and roll the other coloured yarns into several small bundles. Two carpet looms are in use. One is fixed upright from the roof of the house to a pit, about three feet below ground; the other is laid level with the ground from end to end of the weaving room. In the upright loom a carpet of any length and of any breadth can be woven. Any number of weavers, according to the breadth of the carpet, can sit in a row on each side of the loom, face to face, separated by the upright warp. No weaving or loom comb is laid across the web and no warp threads are passed between the teeth of the comb as in cloth weaving. When carpets of six feet broad or less are to be woven they are woven within doors. If a carpet is nine to twenty feet broad, the loom is set upright in an open space under a tree; a trench is dug about three feet deep and three feet broad, and as many feet long as the carpet is to be broad. The top of the loom is tied to a strong branch of the tree and the bottom is fixed in the trench. Several weavers both men and women sit in a row on each side of the warp, face to face, with their feet in the trench. The woof is passed from end to end of the warp not in shuttles, but by the weavers' hands who sit in a row on each side of the warp. By means of a rough mechanism fixed in the trench and worked by the weaver's feet, each time the woof threads are crossed between the warp threads, alternate warp threads are moved forwards and backwards. Instead of the comb frame used in the ordinary loom to drive the woof fibre home, each weaver on either side of the vertical carpet warp threads holds an iron instrument one end of which has blunt saw-like teeth, and with the teeth drives the woof threads into their place. The teeth of the instrument, which serve the purpose of the comb teeth, fix the woof between alternate warp threads. When flowers or other figures are to be woven, each weaver passes the bundles of the woof threads of different colours, between the required number of warp threads, instead of from one end to the other of the carpet, and weaves the required flower or figure. When two or three feet of the carpet are woven the completed part is rolled round a roller in the trench, and the roller with the warp at the top of the loom is loosened a little, and a fresh portion of the warp drawn down and woven. This process is repeated until the required length of carpet is finished. The carpet is then cut from the loom and the weavers begin a new carpet out of the remaining warp threads in

the loom. A carpet thirty-two feet long by ten feet broad costs £12 to £15 (Rs. 120-150), according to the thickness of the texture and the fineness of the workmanship. At the level carpet loom the man weaves a carpet six or seven feet long and four or five broad. The level loom is almost the same as a cloth loom. The weaver does not use any small toothed instrument to drive and fix the woof into the warp threads as in the upright loom. He drives home the woof thread with the regular weaving comb. Instead of the reeds of the cloth comb the teeth of the carpet comb are formed of a close row of iron plates, which are kept in their place by a strong heavy wooden frame. The weaver also uses the shuttle filled with red or black untwisted yarn and with it passes the woof yarn between the warp threads as if weaving in a cloth loom, and, as in cloth weaving, drives the woof thread into its place by pulling towards him the weaving comb. This is done when the carpet to be made is of one or two inch broad red and black stripes. When flowers or figures are to be woven, the weaver passes the woof yarn of all colours by his hand and then pulls the weaving comb towards him to fix the woof thread in its place in the warp.

The *jájam* or floorcloth, an inferior carpet, is adorned with figures of flowers, horses, and elephants. These figures are printed, not woven. Uncoloured common cloth woven with thick yarn to make labourers' and husbandmens' coverlets, jackets, and trousers is bought and cut or sewn together to the required length and breadth. A piece of strong white cloth ten feet by five costs about 4s. (Rs. 2). The cloth is steeped for a night in a solution of sheep's dung, it is washed, and for a second night is soaked in oil and earth salt or fuller's earth. The cloth is washed three or four times, but not so thoroughly as to remove the whole of the oil, and is soaked in a strong solution of myrobalans and water, and dried. The printers have two sets of wooden blocks each about four inches square. One block is carved with the outlines of the creepers, flowers, horses, and elephants, to be printed on the cloth. These outlines stand beyond the plane of the block, so that they may touch the cloth when printing; while the rest of the surface of the block is depressed, so that it does not touch the cloth. In the second block the parts corresponding to the outstanding lines in the first stamp are depressed and do not touch the cloth, while the parts corresponding to the lowered parts in the first stamp, are raised so as to touch the cloth. After the cloth has been steeped in a solution of myrobalans and water the printer dips the first block in a solution of iron rust and water, and stamps the cloth with the outlines of the figures in black. He then dips the second block in a solution of alum and water, and stamps the same parts of the same cloth. The cloth is then boiled in water with some alkali. The parts of the cloth which have been stamped with the iron rust and water remain black, those stamped with the alum and water turn red, and the untouched spaces left by the second stamp become white, when boiling has removed the solution of myrobalans. After the cloth is washed in plain water and dried,

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it is ready for sale, being ornamented with black and white figures on a red ground. To print a cloth ten feet by five costs 4s. (Rs. 2). Another piece of cloth of the same nature and size either dyed in indigo or undyed is laid below the printed piece, and the two are sewn together. The *jájam* is then ready for use. The undyed under-cloth costs 4s. (Rs. 2); if dyed in indigo it costs 1s. (8 as.) more. Thus a floorcloth ten feet by five costs 12s. to 13s. (Rs. 6-6½). Floorcloths are made to order in Hubli and Karajgi by three or four families of Jingars or painters, who claim to be Kshatris. Large numbers of floorcloths printed in Belgaum and other districts are also brought for sale on market days. When not stamping floorcloths, the Jingars or painters make and paint toys, cradles, and other wood work, and draw pictures. Floorcloths last only two or three years, while good carpets last twenty-five to thirty years.

HATS.

Excellent boys' hats in the shape of Bráhma and Marátha turbans are made at Hubli by fifteen families of Jingars and are sold at 2s. to 10s. (Rs. 1-5) each. In making these hats tamarind seeds are soaked in water. Their upper coloured husk is removed and the inner pithy parts are ground into a paste and boiled. The paste is rubbed on several pieces of cloth spread one over the other, according to the required size and shape of the cap and dried. When it is dry the upper part is covered with different coloured velvet and sewn together with silk. The hat is then ornamented with flowers of real or false lace, and the whole is made to look like a Bráhma or a Marátha turban. The inside is stuffed with cotton and lined with printed or silk cloth.

BLANKETS.

White, black, or white and black striped blankets are woven by shepherds. Of 87,768 shepherds shown in the 1881 census about one-tenth or 8700 are blanket weavers. In the Ránebennur sub-division in the south-east large blankets, about sixteen feet by six are woven; the blankets woven in the rest of the district are not larger than nine feet long and four broad for men and 7½ feet long and three broad for children. Generally the women spin the wool into thread, arrange and size the warp, and fill the shuttles; and the men weave. In Dhárwár, wool is not sold by the ordinary *sher* weight. Either the shearing of 100 sheep is bought in a lump for about £4 (Rs. 40), or the wool is bought by the *chitti* or four *sher* millet measure which costs about 16s. (Rs. 8) that is at the rate of 14d. the pound. One *chitti* or fourteen pounds of wool works into four blankets, each nine feet long by four feet broad. Of these four blankets two are black together worth 16s. (Rs. 8) and two are white together worth 8s. (Rs. 4). To spin the wool and weave these four blankets take a man and a woman about forty days, that is after deducting 16s. (Rs. 8) as the cost of one *chitti* of wool, the men and women earn 8s. (Rs. 4) in forty days, or 6s. (Rs. 3) a month. At the rate of three blankets a month for each couple the 8700 blanket weavers, during the eight fair months, yield an estimated outturn of 104,400 blankets worth £31,320 (Rs. 3,13,200). This outturn is not enough to meet the local demand. Blankets are largely imported from Belári and Maisur, part of the imports being used locally and part being sent to the coast. Blanket

weavers generally sell their produce direct to the wearers on market days in local market towns. When not sold in the markets, blankets are sold to local blanket dealers who are generally rich shepherds and are sometimes Lingáyat cloth-dealers. As white and white and black striped blankets fetch 4s. (Rs. 2) each and black blankets fetch 8s. (Rs. 4) each, most of the blankets woven are black.

Goldsmiths who make gold and silver ornaments are found in all large towns. The gold and silver is generally given by customers and worked by the goldsmiths into ornaments at their homes. In rare cases goldsmiths are called by rich men to work at their houses and are paid £1 to £1 4s. (Rs. 10-12) the month. At Hubli and Dhárwár two or three clever goldsmiths cast gold and silver gods, set precious stones in gold, and make richly carved and engraved gold and silver work. Goldsmiths receive no help from the women of their families. The average earnings of a goldsmith's family are £10 to £20 (Rs. 100-200) a year. As a class they are fairly off. During the 1876-77 famine they bought gold and silver ornaments at low prices and made considerable profits. Like tailors, goldsmiths are proverbially fond of stealing part of the materials given to be worked.

Workers in copper and brass, called Kánchgárs if Hindus and Támbatgárs if Musalmáns, are chiefly settled in Hubli where there are about 400 families. The copper and brass are brought in plates or sheets from Bombay. The chief cooking and water pots are *handás* or large round vessels, *tapelás* or small vessels, *panchpátris* or mugs, *kolgás* or jars, *tábans* or plates, *gangáls* or round and short bathing tubs, *kodás* or pitchers, *samayas* or lamps, *dabaris* or basins, and *parás* or large plates. These vessels vary from about two or three inches across and as many high to three to five feet across and three to four feet high. Besides these copper and brass vessels coppersmiths make bellmetal bells and gong plates from *khanchu* or bellmetal a mixture of copper and lead or tin. Musalmáns and Lingáyats generally use white or bellmetal vessels because there is no risk that from want of tinning they should grow poisonous. Besides supplying the local demand the Hubli coppersmiths send copper and brass pots to Belgaum, Bangalur, and Bolári. Copper and brass smiths are a thriving class. The copper and brass sheets are brought from Bombay through Kárwár and Kumta by local dealers of the Bogár, Lingáyat, Márwári, and Musalmán castes. The coppersmiths buy them from the copper-dealers paying 7½d. to 10d. (5-6½ as.) a pound. They sell their wares at 8½d. to 11½d. (5½-7½ as.) a pound, leaving a profit of ½d. to 1½d. (½-1 as.) the pound. During the 1876-77 famine coppersmiths bought old copper and brass vessels at low prices and have since re-sold them at a profit. There has also been a brisk demand for new vessels, and, in the low prices of grain, they have been able to save considerable sums.

Two classes, blacksmiths and iron-smelters, live by working in iron. Almost every town or large village has its blacksmith, Lohár (M.), Kambár (K.), who lives by making articles of iron. Some of these articles are made from lumps of local iron costing about 3d. (2 as.) and about a pound in weight. The rest are made from sheets and

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plates of iron brought from Bombay and Madras. Of the local iron-smelters some account is given below. The iron sheets and plates are brought from Bombay through Kárwár and Kumta by Bohoras and other Musalmáns. The present (1884) price of iron sheets in the Dhárwár markets varies from 12*s.* to 14*s.* (Rs. 6-7) the hundredweight. The blacksmiths, some of whom are men of capital and others are labourers, buy the iron and make it into axes, pickaxes, spades, and other field tools for which husbandmen pay them either in grain or in cash. Blacksmiths also make measures of capacity, tires for wheels, cocoa-kernel and cucumber graters, hoops for tubs, spoons, round plates for baking cakes, lamps, nails, locks, keys, and hooks. The women and children help the men either in blowing the bellows or in heating the iron or steel before it is beaten. The yearly earnings of a blacksmith's family average about £10 (Rs. 100). They suffered much in the 1876 famine from want of work, but during the last four years cheap iron, a brisk demand for their wares, and cheap grain have enabled them to recover much of what they lost.

IRON SMELTING.

Iron is smelted by about thirty Kudivakkalgeri Lingáyats in the village of Tegur fifteen miles north of Dhárwár. The ore is dug out of the Tegur spur of the Sahyádris and the charcoal is made by burning firewood. The ore is broken small by hand-hammers and put with some charcoal into an earthen crucible. Each crucible measures about a foot and a half across inside and two and a half feet outside and is five feet high. On one side of the bottom of the crucible a hole is made and in the hole a clay pipe is fixed. When the furnace below the crucible is sufficiently heated the ore in the crucible melts, and the melted iron runs out by the pipe at the bottom of the crucible into an earthen basin placed to receive it and forms a lump of iron. The lump of iron is removed twice a day at twelve in the morning and at five in the evening. It is heated in another open furnace, laid on an anvil, and beaten by four hammermen into bars about a pound in weight and three feet long and an inch and a half square. The four hammermen work together with much regularity and skill. Each crucible yields two bars a day, the bar being worth about 3*d.* (2 *as.*) the pound. Iron was formerly smelted at many places besides at Tegur. But chiefly from want of fuel the smelting did not pay and the works were closed.

TIN.

There are two classes of tin-workers, makers of tin articles and tinnors of copper and brass vessels. In Dhárwár, Hubli, and Gadag a few Bohoras make tin lanterns, boxes, lamps, glass-cases, small water pipes, tumblers, and toys. The tin plates and the glass panes come from Bombay. All the tinware used in the district is bought at Dhárwár, Hubli, or Gadag. Before tinning them brass and copper vessels are heated and pieces of tin and sal ammoniac are put into them. When the tin and sal ammoniac have melted, the vessel is held fast with a pair of iron pincers and the melted tin is rubbed all over it with a handful of cloth. As a rule Hindus get their vessels tinned inside only and Musalmáns both inside and outside. The cost of tinning varies from 1½*d.* to 1*s.* (1-8 *as.*) according to the size of the vessel.

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STONE.

Three classes work in stone, Josigerus who make stone vessels and Uppárs and Vaddars who work as masons and cut grindstones. All the stone used in the district is found in local quarries. The Josigerus hollow out of a block of soft black stone, called pot-stone in Madras, round cups about five inches across and four high, jugs and tubs about two feet across and a foot high, and large round plates about four feet across and five inches high. These vessels are roughly smoothed by the chisel and sold at $1\frac{1}{2}d.$ to $6s.$ (Rs. $\frac{1}{16}$ - 3). As the sourness causes no corroding or unwholesomeness these stone vessels are of great use in preserving pickles and other sour articles for a year, in cooking sour vegetables, in boiling milk, and in keeping buttermilk. It is a common experience that vegetables cooked in stone have more flavour than vegetables cooked in metal. All the stone vessels made are sold in the district. Besides working as masons or stone-cutters, Uppárs and Vaddars make grindstones. To make grindstones hard stones are cut into two equal circular pieces, each two to three feet across and two to three inches thick. Of these two stones, which are laid one over the other at the time of grinding, the lower stone has a hole in the centre in which a small wooden peg is fixed as a pivot. The upper stone has two holes, one a large hole in the centre through which the stone passes down on the pivot fixed in the lower stone. The other is a side hole in which a wooden peg about a foot long is fixed as a turning handle. Grindstones are sold at $2s.$ (Re. 1) the pair, and a pair is found in almost every house. They are used in grinding grain into flour. At the time of grinding, some handfuls of grain are put into the central hole of the upper stone which is turned by the hand with the handle fixed in the side-hole. Except large and heavy stones which require two women, grindstones are generally worked by one woman. After two or three months the grindstones are roughened by Vaddar women who strike them with a heavy hammer which has steel nails fixed into its head. The cost of roughening a pair of grindstones is about $\frac{3}{4}d.$ ($\frac{1}{4} a.$). Besides a pair of grindstones each house has generally a stone mortar fixed in the ground close to the grindstone. In the stone mortar grain is pounded by four feet long wooden pestles whose ends are shod by iron rings. Stone mortars are made by Uppárs and are sold at $8s.$ to $12s.$ (Rs. 4 - 6).

In almost all towns and large villages earthen pots, tiles, and bricks are made by Lingáyat potters. The clay in general use is a soft and sticky mud from marshes and from the bottom of ponds. It is cleared of stones and well worked with the hands and feet. When properly kneaded the lumps of clay are laid on the centre of a heavy wheel which turns horizontally on a pivot. The potter holds a short wand or bamboo cane in his right hand, and putting the point of the cane close to one of the spokes of the wheel presses it with force till the wheel turns at a high speed. As the wheel turns the potter moulds the whirling clay with his two hands, the squat lump of mud quickly rising outwards and upwards into a shapely jar. When the vessel is properly formed the wheel is stopped, a wetted string held in the two hands is sharply drawn between the bottom of the vessel and the wheel, and the vessel is

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set in the sun to dry. When nearly dry, it is gently tapped with a wooden bat to strengthen the clay, and is then baked in a large kiln. Clay pots are sold at $1\frac{1}{2}d.$ to $3d.$ (1-2 *as.*) each. Tiles and earthen pipes are made and baked in the same way as earthen pots. A potter's wife and children help him greatly in his work. The average earnings of a family are about £10 (Rs. 100) a year. Besides Lingáyat potters a few Mhárs make tiles and bricks.

Wood.

Wood-workers, who are found in almost every large village, are Jingars or carpenters, and Musalmáns. Besides making the wood-work of field tools, cots, cradles, chairs, boxes, tables, stools, and houses, Jingars make wooden figures of tigers, horses, men, cats, and dogs, and other toys, colour them, and sell them on market days and in fairs. Jingars and a few Musalmáns in large towns make wooden hair-combs, and a few Hubli Musalmáns make weaving or loom combs. Hair-combs are thin wooden plates two or three inches square. Hair-combs are of two kinds, head-combs which are toothed on both edges and beard-combs which are toothed only on one edge. Ivory combs are also brought from Bombay. The weaving or loom comb, which is laid across the web and through which the warp threads are passed, is about five feet long and three inches broad. It is made of strong reeds which are brought from the Parvat Milar hills about 430 miles south of Dhárwár in Karnul in Madras, and, after being cut, are formed into a close row of reeds like the teeth of a comb which are kept in their place by a heavy wooden frame. Each time the shuttle passes the comb is pulled towards the weaver so as to drive the thread into its place. A weaving comb costs 6s. to 8s. (Rs. 3-4). Another article made by wood-workers is a pair of wooden grinders on the model of grindstones four to five feet across and a foot and a half thick; they are made of mango or other light wood, as teak or other hard timber would crush the grain. They are used in unhusking rice. The grinding faces are carved like the teeth of a saw, partly in one direction and partly in another. When in regular use they have to be roughened every eight or nine weeks and do not last more than a year or two.

MOLASSES.

In all parts of the district molasses is made from sugarcane. Close to sugarcane fields large wooden sugarcane-mills are fixed in the ground, and near the mills a furnace is made for boiling the juice. The cane is brought from the fields in headloads and piled near the mill. The mill, which is worked by four to six bullocks, consists of a long wooden shaft to which the bullocks are yoked, and of two wooden rollers whose surface is carved with screw rings which work into each other like a male and female screw. As the bullocks go round, the rollers turn in opposite directions and crush the cane with which they are kept constantly fed. The juice runs into a large earthen vessel which is buried close to the rollers. A man sits on the opposite side of the rollers, draws off the pressed canes, and hands them back to the feeders who double them and again pass them between the rollers. This is repeated a third time when the whole juice is supposed to be pressed out, and the pith of the pressed cane is spread in the air to dry and generally used to boil the juice. When the vessel into which

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the juice runs is filled, the juice is taken to the furnace and poured into an iron pan about four feet high and eight feet across at the top and four or five feet at the bottom. The pan is put on the furnace, and a large fire is lighted below. After boiling for about six hours the juice thickens into liquid molasses. The liquid is taken out and put into round or square holes in the earth which are lined with cloth. It is then allowed to cool; when it thickens the molasses is ready for use and sale. In an ordinary year the price varies from $1\frac{1}{2}d.$ to $2d.$ the pound (Rs. $1\frac{1}{2}$ - 2 the *man*). Since about 1840, when the Mauritius cane was introduced, a little white sugar and sugarcandy have been made in Hángal. They are inferior to the China and other sugar imported by Vengurla and Kárwár. Formerly all the fine sugar and sugarcandy were imported by Rájápur in Ratnágari and went by the name of Rájápur sugar.

GLASS BANGLES.

Glass Bangles are made by about ten families of Bogár or Jain bangle-makers. Of the raw materials bangle glass is brought in lumps from Belári at about £2 the hundredweight (Rs. $4\frac{1}{2}$ the *man*). In Belári bangle glass is made by melting a particular sand with some alkalis. At the time of melting bangle glass is coloured either green, blue, red, or black. In making bangles a lump of this glass is melted in a half-closed earthen caldron. Four men sit round the caldron. Each thrusts into the molten glass a long iron spike with a bent end. When it is drawn back, the spike brings with it a few grains of melted glass. The bangle-maker, who is standing close by, immediately taps with a knife the head of the bent end of the spike, and while it is yet red-hot the molten glass runs up the spike like a small ring. The red-hot glass ring is with the help of some cross nails at once moved to a cone-shaped iron rod set upright in the ground about two feet from the furnace. The iron rod is then turned round on a roller and the bangle is shaped with a knife. In this way a bangle-maker shapes about twenty-five bangles in fifteen minutes. In one day four men working together can make a *man* or twenty-five pounds of lump glass into 4500 bangles. When the day's work is over, the makers gather and string the bangles. These are sold at about £2 10s. the hundredweight (Rs. $5\frac{1}{2}$ the *man*). The bangle-makers earn about £10 (Rs. 100) a year. These glass bangles are worn by the women and girls of all castes except by some widows. Except some under twenty whose heads have not been shaved, Bráhmaṇ widows do not wear bangles; Marátha and other widows break their bangles at the death of their husbands, and afterwards put on new ones. Musalmán widows do not wear bangles. As glass bangles are in great demand, they are brought from Bombay, Belári, and Maisur by Bogár-Jain and Musalmán bangle-dealers.

Oil is extracted chiefly by Lingáyat Ganigiás from sesamum, linseed, safflower, and castor seed, grown in the district and bought by the oil pressers from the growers. Small quantities of oil are also extracted from spices and almonds for medicine and perfume. From sesamum linseed and safflower the oil is extracted by pressing the seeds in an oil mill; from castor seed the oil is extracted by boiling its pulp in hot water; and from spices and almonds

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the oil is extracted by distilling. The mortar of the oil mill used in pressing sesamum, linseed, and safflower is a huge stone eight feet long and about twelve feet round. The lower part is buried in the ground. The upper three feet are hollowed out and lined inside with wood, which has to be renewed once a year. None of the three grains, sesamum linseed or safflower, is put alone in the mortar. If any of these is pressed by itself it yields little oil, while if equal quantities of any two or more of these grains are pressed together, the outturn is greatly increased. After the stone mortar has been fresh lined with wood it does not hold more than twenty-nine pounds (8 *shers*) of seed. Afterwards, when the roller or piston wears away the wood, the mortar daily holds a larger quantity of grain, till, in the course of a year, it can hold 115 pounds (32 *shers*) of seed. Before putting them into the mortar the seeds are slightly wetted. The roller is turned round and round in the mortar by means of bullocks yoked to a cross shaft which is attached to the roller from outside. This process expresses and separates the oil from the seed. The oil is taken out for use and the crushed seed is scraped out and used as cattle food. When a mortar holds only twenty-nine pounds (8 *shers*) of seeds two good bullocks take about two hours to press the oil. When the mortar begins to hold up to 115 pounds (32 *shers*) the pressing takes about twice as long. So with a freshly repaired mill oil is drawn out six times a day and only three times when the wooden lining gets worn. Sesamum oil is sold both wholesale and retail at about 3½d. to 4½d. the pound (Rs. 3-4 the *man* of twenty pounds). In retail oil is generally sold from house to house by Ganigia women. Since 1876 the importation of kerosine oil has greatly reduced the profits of the oil-pressers.

To extract oil by boiling, castor seeds are parched in pans until they become red, and give out a pleasant smell, when they are pounded to flour in a mortar. The flour is thrown into an earthen vessel about half full of boiling water, and it is allowed to boil until nearly all the water has passed off in steam. By this time, the oil begins to float and it is carefully poured into another vessel and preserved. The oil is now in its purest state fit for anointing a new-born babe.

Oil is distilled from spices and almonds. The almonds or spices from which the oil is to be distilled are put in an earthen cup with a little water in it. Under the cup a strong fire is lighted. The cup is covered with a second cup having a horizontal tube fastened to it, and the division between the two cups is carefully closed with clay. A wet cloth is laid on the top of the upper cup and cold water is constantly dropped on the cloth. By keeping the cup cool the vapour of oil that rises from the heated jar condenses and passing down the tube drops into a third cup. In the second form of still, which is less common than the first, the cooling or condensing is done by earth not by water. A jar is buried in the ground and over its mouth is set a second jar with a very small hole bored in its bottom. The oil seed is put into the upper jar, its mouth is carefully closed, and the whole jar is surrounded with fire. The cool air in the lower jar condenses the vapour and the oil falls in drops into it.

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REDPOWDER.

Redpowder or *kunku*, literally saffron, is made at Dhárwár and in a few other places. At Dhárwár about thirty families of low-caste Hindus and two or three families of Musalmáns make redpowder. A small quantity is also made by Bráhmans as some strict Hindus will use none but Bráhma-man-made redpowder. To make redpowder six pounds of turmeric root are soaked in water for three days, dried, and broken into pieces. The pieces are soaked for three days in a liquid mixture of lemon-juice and powder of three-fourths of a pound of *balgar* or borax and five-eighths of a pound of alum or *fatki*. They are then dried and ground into fine redpowder called *kunku*. The materials cost about 2s. 6d. (Rs. 1¼), and yield seven pounds of *kunku* worth about 3s. 6d. (Rs. 1¾) at the selling price of 6d. (4 as.) the pound. Sometimes, to deepen the colour, a few drops of oil are added to the *kunku*, but this colour soon passes off. All Hindu women whose husbands are alive mark their brows with redpowder.

INK.

Besides English ink, which is much used in public offices, two kinds of local ink are made. Of these one kind is used in public offices in writing on country paper and the other is used by Bráhmans in writing religious books. To make the native official ink one-sixteenth of a pound of rice, Indian millet, and *rági* are put in an earthen vessel and placed on a furnace. When the grains are about to take fire, a gallon of water is poured into the vessel, and the whole is allowed to boil. The liquid is strained and poured into a plate. Lamp-black tied in a cloth is then ground into the liquid and the ink is ready for use. This ink does well for writing on country paper into which it soaks a little, but when written on smooth polished paper it is easily washed off. In writing religious books both black and red ink are used. To make black ink two and two-thirds ounces (6 *tolás*) of good sealing-wax or *bhangardargu* and four-fifths of an ounce (2 *tolás*) of *balgar* or borax are boiled together for about an hour in a pint (40 *tolás*) of water, and the liquid is strained. Some lamp-black tied in a cloth is ground into the liquid and the ink is ready. It shines when written, cannot be scratched or washed off the paper, and is said to last unfaded for centuries. To make red ink two and two-fifths ounces (6 *tolás*) of bad sealing-wax or *khaddiargu*, four-fifths of an ounce (2 *tolás*) of *balgar* or borax, one-fifteenth of an ounce ($\frac{1}{3}$ *tola*) of *alikhán* (*Eschynomene aspera* leaves, and two-fifteenths of an ounce ($\frac{1}{3}$ *tola*) of *chijjikhár* or alkali, are boiled together in one pint (40 *tolás*) of water, and the liquid is strained. This forms a good red ink. If lampblack is added, it turns to a dull but serviceable black ink.

LEATHER.

There are two classes of leather-workers, tanners and shoemakers. The tanners are chiefly Madigerus, Holerus, and Dhorarus. The skins are stripped off dead animals and the inside is rubbed with water and lime at two to four pounds for each skin. The skins are then steeped in water for fifteen days. The hair is next scraped off with a broad blunt knife and the skins are again steeped in a mixture of myrobalans and *bábhul* bark for six days when they are taken out and dried into leather. The leather is partly used in making shoes, ropes, and other articles of husbandry, and is

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partly sent by hide-dealers to Bombay and Madras. Shoemakers are either Mochigárárus or Samgars (K.). Samgars or Chámhbárs make and mend shoes and sandals, tan, and cover bamboo boats with leather. Shoes and sandals are sold at 1s. to 4s. (Rs. $\frac{1}{2}$ -2) the pair.

SALTPETRE.

Three crafts, the making of saltpetre, earth-salt, and paper, have almost altogether died out. In 1841 saltpetre was made at Dhárwár.¹ In a plain outside of the town men of the Uppár caste raised an earthen mound or pillar about fifteen feet high and 100 feet round. On the top of the mound were built seven or eight basins of lime and stones each about four feet across and ten feet deep. At the bottom of each of these basins was a hole carefully filled. In the ground round the mound several pits were dug five or six feet square and a foot deep. From each of these pits a channel two or three inches broad led to the hole at the bottom of each of the basins. The hole in each of the masonry cisterns on the top of the mound was then filled with leaves from the inside and the cistern was partly filled with salt-earth or *saulumannu*. Over the salt-earth water was poured, which, draining through the salt-earth and leaves, passed out by the channels and brought all the saltpetre into the small pans or pits. When the pits were full the holes were stopped and the water was left to dry in the sun. When the pan was dry the saltpetre was scraped off the bottom and purified. At present (1883) one shepherd family who call themselves Uppárs that is salt-makers make saltpetre in the *jágir* village of Hebli. The right of making saltpetre is yearly farmed for about £1 7s. (Rs. 13½) by the two sharers of the Hebli estate. Every year, provided no rain falls during these two months, saltpetre is made between January and March. If rain falls the saltpetre is washed away and the labour is wasted. During these two months about 900 pounds (36 *mans*) of saltpetre are yearly made and fetch about £5 8s. (Rs. 54) at 1½d. the pound (Rs. 1½ the *man*).

EARTH SALT.

About thirty years ago earth salt, called in Kánarese *sauluppu* that is brackish salt and *manuppu* that is earth salt, was extracted in several parts of Dhárwár from a peculiar kind of earth containing salt. Earth salt was made in the same way and by the same class of people as saltpetre. The making of earth salt has been stopped under the salt act, Act VII. of 1873.

PAPER.

About twenty years ago, paper was made at Dhárwár, Gadag, Gutal, Hubli, Karajgi, Návalgand, Ránebennur, and several other places in Dhárwár. Since then the craft has almost or altogether died away under the competition of better and cheaper European paper.

¹ Saltpetre has two names in Kánarese *soruppu* and *moddupu*. *Uppu* means salt, and as saltpetre when fired makes a noise like *sor* it is called *soruppu* that is the *sor* sounding salt. Saltpetre is also called *modduppu* or gunpowder salt. Though spelt in the same way Uppár a salt-maker is differently pronounced from Uppár a mason. Ráv Bahádur Tirmalráy.